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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/567,893	**Applicant(s)** TANIGUCHI, TOMOHIKO	
	Examiner FAN NG	**Art Unit** 4145	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *08 February 2006*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-19* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1,3,4,6,7,9,10 and 12-15* is/are rejected.
7)☒ Claim(s) *2,5,8,11,16-19* is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/08/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, Drawings must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

a. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must

be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawing is objected, because the interpolation of time, frequency domain signal is in part 6 "transmission line estimating part" as disclosed in the specification (second paragraph under first exemplary embodiment). And in claim 1 interpolation unit has time and frequency domain signal coming into, furthermore, none of the drawing shows time and frequency domain signal go into part 6 transmission line estimation partt.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim(s) 1, 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhidkov (20050213692) in view of Henriksson (2006/0116095) and further in view of Meyer (7173983).

6. As per claim 1, **Zhidkov teaches** a disturbing signal detecting device **(Fig. 3, is a device to detect impulse noise and compensate the noise of a signal, which is same as detect a disturbing signal, because noise create disturbing to a signal)** in which a plurality of carriers having frequencies orthogonal to each other **([0001-0002]: multiple carrier modulation such as orthogonal frequency division multiplexing (OFDM))** in a transmission band are modulated with allocated information signal **(it is inherent, that the received signal must occupy a transmission band otherwise, no signal can be transmitted, and in [0001] multiple carrier modulation is used, thus mean modulate information onto sub-carriers)**, the device receives an OFDM transmission signal **(Fig. 3, rk means receiving and [0002] OFDM is used)** with a known pilot signal periodically inserted for the plurality of carriers modulated with the information signal **(Fig. 2 and [0029]: pilot is inserted, it is inherent, that the pilot must be known and inserted periodically, because the purpose of pilot is to estimate, for example, channel, delay etc. (distortion of the signal), thus if pilot is not known to the receiver then it lose its purpose. Also in Fig. 2, #212 pilot is add to every transmission frame, thus periodically)**, and detects a disturbing signal included in the signal received, comprising:

7. an IFFT computing unit for performing an IFFT computation for a transmission line characteristic **(Fig. 3, #322: IFFT is computing the impulse noise estimation**

which is characteristic of transmission line or channel) calculated from the pilot signal **(Fig. 3, #314: the IFFT calculation is based on (or from) the pilot signal)**;

8. a threshold processing part that compares a time-base signal obtained as a result of an IFFT computation by the IFFT computing unit **(Fig. #326: peaks detection is a threshold processing part, shown in [0073-0075]. Which is obtained from Fig. 3, #322 IFFT unit)**, with a threshold **([0075])**,

9. an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal **(Fig. 3, #328: FFT after threshold processing, and the basic principle of FFT is to bring the signal to frequency domain)**;

10. and calculates a disturbing signal added to an OFDM signal band **(Fig. 3, is a process to calculate and compensated the disturbed OFDM signal)**.

11. **Zhidkov doesn't teach** … and if the time-base signal exceeds the threshold, substitutes zero for a value of the signal; … and an interference detector that interpolates timewise and frequencywise the frequency-base signal obtained from the FFT computing unit, and calculates a disturbing signal added to an OFDM signal band.

12.

13. **Henriksson teaches** ... and if the time-base signal exceeds the threshold, substitutes zero for a value of the signal **([0006]: signal levels exceeding certain levels in time domain are detected and those samples are the replaced by zeros)**;

14. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of threshold to detect the large peaks and set it to zero, such as to some samples are known to be unreliable in any case, they are in the analogues art of receiver design of multi-carrier signal.

15. **Zhidkov and Henriksson do not teach** ... and an interference detector that interpolates timewise and frequencywise the frequency-base signal obtained from the FFT computing unit, and calculates a disturbing signal added to an OFDM signal band.

16. **Meyer teaches** and an interference detector **(Fig. 8)** that interpolates timewise and frequencywise the frequency-base signal obtained from the FFT computing unit **(timewise signal is come from #42, and frequencywise signal after FFT is come from #14, in addition, #18 is doing the interpolation)**, ...

17. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Meyer into Zhidkov, since

Zhidkov suggests how to detect a disturbed OFDM signal in general and Meyer suggests the beneficial use of interpolate the time and frequency wise signal, such as interpolate the distorted signal give easy way to estimate them and correct them, they are in the analogues art of receiver design of multi-carrier signal.

18. As per claim 3, **Zhidkov, Henriksson and Meyer teach** the disturbing signal detecting device as claimed in claim 1, further comprising:

19. **Zhidkov and Meyer do not teach** a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained from the interference detector, as a level of a disturbing signal for an entire signal band.

20. **Henriksson teaches** a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal **(Fig. 6, #608 and [0046]: statistical averaging operation and #608 is after #604 which is after FFT (frequency wise signal))** obtained from the interference detector **(Fig. 6, #606: the different between observed values and known values)**, as a level of a disturbing signal for an entire signal band **(Fig. 6, Signal is disturbed shown in #606, and all the signal is going to have the same process, thus it is entire signal band)**.

21. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of average the signal to estimate the error introduced by

signal, such as that it is must first to know the error of the signal, then to correct them, they are in the analogues art of receiver design of multi-carrier signal.

22. Claim(s) 4, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhidkov (20050213692) in view of Henriksson (2006/0116095) and further in view of Gore (2005/0157801) and Bevan (6064066).

23. As per claim 4, A disturbing signal detecting device in which a plurality of carriers having frequencies orthogonal to each other in a transmission band are modulated with allocated information signal, the device receives an OFDM transmission signal with a known pilot signal periodically inserted for the plurality of carriers modulated with the information signal, and detects a disturbing signal included in the signal received, comprising:

24. **Zhidkov teaches** an IFFT computing unit for performing an IFFT computation for a transmission line characteristic **(Fig. 3, #322: IFFT is computing the impulse noise estimation which is characteristic of transmission line or channel)** calculated from the pilot signal **(Fig. 3, #314: the IFFT calculation is based on (or from) the pilot signal)**;

25. a threshold processing part that compares a time-base signal obtained as a result of an IFFT computation by the IFFT computing unit **(Fig. #326: peaks detection is a threshold processing part, shown in [0073-0075]. Which is obtained from Fig. 3, #322 IFFT unit)**, with a threshold **([0075])**,

26. an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal **(Fig. 3, #328: FFT after threshold processing, and the basic principle of FFT is to bring the signal to frequency domain)**;

27. and calculates a disturbing signal added to an OFDM signal band **(Fig. 3, is a process to calculate and compensated the disturbed OFDM signal)**.

28. **Zhidkov doesn't teach** and if the time-base signal is smaller than the threshold, substitutes zero for a value of the signal; ... a subtraction processing part that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal of the transmission line characteristic calculated from the pilot signal and an interference detector that interpolates timewise and frequencywise the frequency-base signal obtained from the subtraction processing part

29. **Gore teaches** and if the time-base signal is smaller than the threshold, substitutes zero for a value of the signal **([0060]: setting taps value to zero if less than threshold, know the tap value is the received time-base signal)**;

30. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Gore into Zhidkov, since Zhidkov

suggests how to detect a disturbed OFDM signal in general and Gore suggests the beneficial use of threshold to detect the small peaks and set it to zero, such as to simplify the calculate since very small values are not contribute much to the process, they are in the analogues art of receiver design of multi-carrier signal.

31. **Zhidkov and Gore doesn't teach** a subtraction processing part that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal of the transmission line characteristic calculated from the pilot signal and an interference detector that interpolates timewise and frequencywise the frequency-base signal obtained from the subtraction processing part

32. **Henriksson teaches** a subtraction processing part that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal of the transmission line characteristic calculated from the pilot signal **(Fig. 6, # 606 and [0075]: in order to calculate the different, it means to subtract first)**; ...

33. timewise and frequencywise the frequency-base signal obtained from the subtraction processing part **(Fig. 6, #606)**

34. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of threshold to detect the large peaks and set it to zero,

such as to some samples are known to be unreliable in any case, they are in the analogues art of receiver design of multi-carrier signal.

35. **Zhidkov, Gore and Henriksson do not teach** and an interference detector that interpolates ... subtraction processing part

36. **Bevan teaches** and an interference detector that interpolates ... subtraction processing part **(col. 18, line 22-25: the different between two part is the same as subtraction)**, ...

Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Bevan into Henriksson, since Henriksson suggests take the different of estimated signal and actual received signal, and Bevan suggests interpolates the different between two parties, such as to increase the resolution, they are in the analogues art of enhance the resolution of received signal.

37. As per claim 6, **Zhidkov, Henriksson, Gore, and Bevan teach** the disturbing signal detecting device as claimed in claim 4, further comprising:

38. **Zhidkov, Gore, and Bevan do not teach** a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained from the interference detector, as a level of a disturbing signal for an entire band of a signal received.

39. **Henriksson teaches** a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained **(Fig. 6, #608 and [0046]: statistical averaging operation and #608 is after #604 which is after FFT (frequency wise signal))** from the interference detector **(Fig. 6, #606: the different between observed values and known values)**, as a level of a disturbing signal for an entire band of a signal received **(Fig. 6, Signal is disturbed shown in #606, and all the signal is going to have the same process, thus it is entire signal band)**.

40. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of average the signal to estimate the error introduced by signal, such as that it is must first to know the error of the signal, then to correct them, they are in the analogues art of receiver design of multi-carrier signal.

41. Claim(s) 7, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhidkov (20050213692) in view of Henriksson (2006/0116095) and further in view of Yamaguchi (US 7099270)

42. As per claim 7, A disturbing signal detecting device in which a plurality of carriers having frequencies orthogonal to each other in a transmission band are modulated with

allocated information signal, the device receives an OFDM transmission signal with a known pilot signal periodically inserted for the plurality of carriers modulated with the information signal, and detects a disturbing signal included in the signal received, comprising:

43. **Zhidkov teaches** a transmission line estimating part that obtains a transmission line characteristic calculated from pilot signals **(Fig. 3, is a impulse nose reducer and compensator, which is a characteristic come from the channel (transmission line). The pilot is used in #314 to help estimation)**,

44. frequencywise the transmission line characteristic calculated from the pilot signal **(Fig. 3, after #322 is time signal and after #328 is frequency signal and both of them is estimated from the pilot signal, moreover the purpose is to calculate the impulse noise which is a characteristic of channel)**,

45. an IFFT computing unit that performs an IFFT computation for a signal indicating a transmission line characteristic **(Fig. 3, #322: IFFT is computing the impulse noise estimation which is characteristic of transmission line or channel)** of all OFDM carriers obtained from the transmission line estimating part **(Fig. 3, #314: the IFFT calculation is based on (or from) the pilot signal measuring unit #308)**;

46. a threshold processing part that compares a time-base signal obtained as a result of an IFFT computation by the IFFT computing unit **(Fig. #326: peaks detection is a threshold processing part, shown in [0073-0075]. Which is obtained from Fig. 3, #322 IFFT unit)**, with a threshold **([0075])**,

47. and an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal **(Fig. 3, #326 the threshold processing part and #328 converts to a frequency base signal)**.

48. Zhidkov doesn't teach interpolates timewise and ... line characteristic calculated from the pilot signal based on an arrangement rule of the pilot signal ... and if the time-base signal exceeds the threshold, substitutes zero for a value of the signal; and an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal.

49. Yamaguchi teaches interpolates timewise and ... line characteristic calculated from the pilot signal **(col. 4, line 21-24)** based on an arrangement rule of the pilot signal **(col. 4, line 24-26: interpolate is depends on the position of the pilot, thus depends on the arrangement of the pilot.)**

50. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Yamaguchi into Zhidkov, since Zhidkov suggests frequency wise signal estimated from pilot, and Yamaguchi suggests interpolates signal according to the position of the pilot, such as to increase the resolution of the signal, they are in the analogues art of enhance the resolution of received signal.

51. **Zhidkov and Yamaguchi do not teaches** and if the time-base signal exceeds the threshold, substitutes zero for a value of the signal; and an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal.

52. **Henriksson teaches** and if the time-base signal exceeds the threshold, substitutes zero for a value of the signal **([0006]: signal levels exceeding certain levels in time domain are detected and those samples are the replaced by zeros)**;

53. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of average the signal to estimate the error introduced by signal, such as that it is must first to know the error of the signal, then to correct them, they are in the analogues art of receiver design of multi-carrier signal.

54. As per claim9, **Zhidkov, Henriksson and Yamaguchi teach** the disturbing signal detecting device as claimed in claim 7, further comprising:

55. **Zhidkov, and Yamaguchi do not teach** a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained from the FFT computing unit, as a level of a disturbing signal for an entire band of a signal received.

56. **Henriksson teaches** a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained **(Fig. 6, #608 and [0046]: statistical averaging operation and #608 is after #604 which is after FFT (frequency wise signal))** from the FFT computing unit **(Fig. 6, #606: the different between observed values and known values)**, as a level of a disturbing signal for an entire band of a signal received **(Fig. 6, Signal is disturbed shown in #606, and all the signal is going to have the same process, thus it is entire signal band)**.

57. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of average the signal to estimate the error introduced by signal, such as that it is must first to know the error of the signal, then to correct them, they are in the analogues art of receiver design of multi-carrier signal.

58. Claim(s) 10, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhidkov (20050213692) in view of Henriksson (2006/0116095) and further in view of Gore (2005/0157801) and Yamaguchi (7099270).

59. As per claim 10. A disturbing signal detecting device in which a plurality of carriers having frequencies orthogonal to each other in a transmission band are modulated with allocated information signal, the device receives an OFDM transmission signal with a known pilot signal periodically inserted for the plurality of carriers modulated with the information signal, and detects a disturbing signal included in the signal received, comprising:

60. **Zhidkov teaches** a transmission line estimating part that obtains a transmission line characteristic calculated from pilot signals**(Fig. 3, is a impulse nose reducer and compensator, which is a characteristic come from the channel (transmission line). The pilot is used in #314 to help estimation)**,

61. frequencywise the transmission line characteristic calculated from the pilot signal **(Fig. 3, after #322 is time signal and after #328 is frequency signal and both of them is estimated from the pilot signal, moreover the purpose is to calculate the impulse noise which is a characteristic of channel)**,

62. an IFFT computing unit that performs an IFFT computation for a signal indicating a transmission line characteristic **(Fig. 3, #322: IFFT is computing the impulse noise estimation which is characteristic of transmission line or channel)** of all OFDM carriers obtained from the transmission line estimating part **(Fig. 3, #314: the IFFT calculation is based on (or from) the pilot signal measuring unit #308)**;

63. a threshold processing part that compares a time-base signal obtained as a result of an IFFT computation by the IFFT computing unit **(Fig. #326: peaks detection is a threshold processing part, shown in [0073-0075]. Which is obtained from Fig. 3, #322 IFFT unit)**, with a threshold **([0075])**,

64. and an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal **(Fig. 3, #326 the threshold processing part and #328 converts to a frequency base signal)**.;

65. Zhidkov doesn't teach interpolates timewise and … line characteristic calculated from the pilot signal based on an arrangement rule of the pilot signal … and if the time-base signal is smaller than the threshold, substitutes zero for a value of the signal … and a subtraction processing part that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal transmission line characteristic calculated from pilot signals.

66. Yamaguchi teaches interpolates timewise and ... line characteristic calculated from the pilot signal **(col. 4, line 21-24)** based on an arrangement rule of the pilot signal **(col. 4, line 24-26: interpolate is depends on the position of the pilot, thus depends on the arrangement of the pilot.)**

67. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Yamaguchi into Zhidkov, since Zhidkov suggests frequency wise signal estimated from pilot, and Yamaguchi suggests interpolates signal according to the position of the pilot, such as to increase the resolution of the signal, they are in the analogues art of enhance the resolution of received signal.

68. **Zhidkov and Yamaguchi do not teach** and if the time-base signal is smaller than the threshold, substitutes zero for a value of the signal ... and a subtraction processing part that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal transmission line characteristic calculated from pilot signals.

69. **Gore teaches** and if the time-base signal is smaller than the threshold, substitutes zero for a value of the signal **([0060]: setting taps value to zero if less than threshold, know the tap value is the received time-base signal)**;

70. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Gore into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Gore suggests the beneficial use of threshold to detect the small peaks and set it to zero, such as to simplify the calculate since very small values are not contribute much to the process, they are in the analogues art of receiver design of multi-carrier signal.

71. **Zhidkov, Yamaguchi and Gore do not teach** and a subtraction processing part that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal transmission line characteristic calculated from pilot signals.

72. **Henriksson teaches** and a subtraction processing part **(Fig. 6, #606: the different between observed values and known values)** that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal transmission line characteristic calculated from pilot signals **([Fig. 6, #606 and [0075]: the actual values calculated is go through a FFT processing so it is a frequency domain signal, and observed signal is from pilot)**.

Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of average the signal to estimate the error introduced by

signal, such as that it is must first to know the error of the signal, then to correct them, they are in the analogues art of receiver design of multi-carrier signal.

73. As per claim 12, **Zhidkov, Henriksson, Gore and Yamaguchi teach** the disturbing signal detecting device as claimed in claim 10, further comprising:

74. **Zhidkov, Gore and Yamaguchi do not teach** a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained from the subtraction processing part, as a level of a disturbing signal for an entire band of a signal received.

Henriksson teaches a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained **(Fig. 6, #608 and [0046]: statistical averaging operation and #608 is after #604 which is after FFT (frequency wise signal))** from the subtraction processing part **(Fig. 6, #606: the different between observed values and known values)**, as a level of a disturbing signal for an entire band of a signal received **(Fig. 6, Signal is disturbed shown in #606, and all the signal is going to have the same process, thus it is entire signal band)**.

75. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Henriksson into Zhidkov, since Zhidkov suggests how to detect a disturbed OFDM signal in general and Henriksson suggests the beneficial use of average the signal to estimate the error introduced by

signal, such as that it is must first to know the error of the signal, then to correct them, they are in the analogues art of receiver design of multi-carrier signal.

76. Claim(s) 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhidkov (20050213692) in view of Henriksson (2006/0116095) and further in view of Gore (2005/0157801), Bevan (6064066), Meyer (7173983), Yanaguchi (7099270), and Hong (5134635).

77. As per claim 13, An OFDM receiver that includes:

78. **Zhidkov teaches** a received signal FFT computing unit that converts a received signal to a frequency-domain signal **(Fig. 3, #302)**;

79. a pilot extractor that extracts a pilot signal from the frequency-domain signal and calculates a transmission line characteristic of a carrier in which the pilot signal existed **(Fig. 3, #314: pilot insertion unit is actually help to estimate the channel characteristic see [0085], all signal after #320 is in frequency domain)**;

80. a transmission line characteristic estimating part that … and frequencywise …, and calculates an estimate for a transmission line characteristic of all OFDM carriers **(Fig. 3, channel characteristic is estimated, after #302 FFT unit signal is in frequency domain)**;

81. wherein the OFDM receiver **(Fig. 3)** corrects the likelihood according to the disturbing signal calculated by the interference detector included in the disturbing signal detecting device **(Fig. 3, #312: disturbing signal come from rk is compensated, where rk is measuring (disturbing signal detecting) at #308 and estimating (interference detector)).**

82. **Zhidkov doesn't teach** ...interpolates timewise ... transmission line characteristic calculated by the pilot extractor... a divider that divides the output from the received signal FFT computing unit, by the estimate for the transmission line characteristic ... a soft decision part that calculates likelihood based on a distance from a transmitted signal point to a received signal point; and an error correcting part that performs error correction using the likelihood, further comprising the disturbing signal detecting device as claimed in one of claim 1 and claim 4,

83.

84. **Yamaguchi teaches** ...interpolates timewise ... transmission line characteristic calculated by the pilot extractor... **(col. 4, line 24-26: channel is estimated, time domain signal is interpolated according to pilot)**

85. a divider that divides the output from the received signal FFT computing unit, by the estimate for the transmission line characteristic **(Fig. 8, #84, and it is for estimation the channel, col. 2, line 45-55)**;

86. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Yamaguchi into Zhidkov, since Zhidkov suggests frequency wise signal estimated from pilot, and Yamaguchi suggests interpolates signal according to the position of the pilot, such as to increase the resolution of the signal, they are in the analogues art of enhance the resolution of received signal.

87. **Zhidkov and Yamaguchi do not teach** a soft decision part that calculates likelihood based on a distance from a transmitted signal point to a received signal point;

88. and an error correcting part that performs error correction using the likelihood, further comprising the disturbing signal detecting device as claimed in one of claim 1 and claim 4,

89. **Hong teaches** a soft decision part that calculates likelihood based on a distance from a transmitted signal point to a received signal point **(col. 1, 35-40)**;

90. and an error correcting part that performs error correction using the likelihood **(Fig. 2B, error corrected at #219 and it is depends on #215 where bit metric is calculated, which further depends on Euclidean distance (col. 3, line 31-36), thus max. likehood is used (col. 1, line 39-41))**, further comprising the disturbing signal detecting device as claimed in one of claim 1 and claim 4 **(for a disturbed signal,**

disturbing come from channel not any particular hardware or method, thus any disturbed signal teach the claim. Furthermore, the detecting device is just a label, which is include in a OFDM receiver, so as this claim. Thus OFDM receiver includes the disturbing signal detecting device),

91. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Hong into Zhidkov, since Zhidkov suggests frequency wise signal estimated from pilot, and Hong suggests use soft-decision to detect the bits, such as soft decision give more leverage on the side effect, depends more on designer, give more flexibility, they are in the analogues art of digitial communication.

92. As per claim 14, An OFDM receiver that includes:

93. a received signal FFT computing unit that converts a received signal to a frequency-domain signal; a pilot extractor that extracts a pilot signal from the frequency-domain signal and calculates a transmission line characteristic of a carrier in which the pilot signal existed; a transmission line characteristic estimating part that interpolates timewise and frequencywise the transmission line characteristic calculated by the pilot extractor, and calculates an estimate for a transmission line characteristic of all OFDM carriers; a divider that divides the output from the received signal FFT computing unit, by the estimate for the transmission line characteristic; a soft decision part that

calculates likelihood based on a distance from a transmitted signal point to a received signal point; and an error correcting part that performs error correction using the likelihood, further comprising the disturbing signal detecting device as claimed in claim 7 **(for a disturbed signal, disturbing come from channel not any particular hardware or method, thus any disturbed signal teach the claim. Furthermore, the detecting device is just a label, which is including in an OFDM receiver, so as this claim. Thus OFDM receiver includes the disturbing signal detecting device)**, wherein the OFDM receiver corrects the likelihood according to the disturbing signal calculated by the FFT computing unit included in the disturbing signal detecting device.

The following limitations were taught by claim 13.

94.

As per claim15, An OFDM receiver that includes: a received signal FFT computing unit that converts a received signal to a frequency-domain signal; a pilot extractor that extracts a pilot signal from the frequency-domain signal and calculates a transmission line characteristic of a carrier in which the pilot signal existed; a transmission line characteristic estimating part that interpolates timewise and frequencywise the transmission line characteristic calculated by the pilot extractor, and calculates an estimate for a transmission line characteristic of all OFDM carriers; a divider that divides an output from the received signal FFT computing unit, by the estimate for the transmission line characteristic; a soft decision part that calculates likelihood based on a distance from a transmitted signal point to a received signal point; and an error correcting part that performs error correction using the likelihood, further comprising the

disturbing signal detecting device as claimed in claim 10 **(for a disturbed signal, disturbing come from channel not any particular hardware or method, thus any disturbed signal teach the claim. Furthermore, the detecting device is just a label, which is including in an OFDM receiver, so as this claim. Thus OFDM receiver includes the disturbing signal detecting device)**, wherein the OFDM receiver corrects the likelihood according to the disturbing signal calculated by the subtraction processing part included in the disturbing signal detecting device.

The following limitations were taught by claim 13.

95.

Allowable Subject Matter

96. Claim (s) 2, 5, 8, 11, 16, 17, 18, 19 is/are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

b. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FAN NG whose telephone number is (571)270-3690. The examiner can normally be reached on Monday-Friday; 7:30am-5:30pm.

c. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pankaj Kumar can be reached on (571)272-3011. The

fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

d. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

97. 98.

99. FN

/Robert W Wilson/
Primary Examiner, Art Unit 2419